Elsevier has created a Monkeypox Information Center in response to the declared public health emergency of international concern, with free information in English on the monkeypox virus. The Monkeypox Information Center is hosted on Elsevier Connect, the company's public news and information website.

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Correspondence

Monkeypox virus (MPX) in humans a concern: Trespassing the global boundaries – Correspondence

Dear Editor,

Amid the disastrous consequences of the SARS-CoV-2 Omicron sub-variant, the world is now encountering another outbreak of Monkeypox infection (MPX), which is spreading at an alarming speed [1]. Belonging to the family of smallpox, which was eradicated in 1980, MPX is endemic to West and Central Africa in the proximity to tropical rainforests. The first human case of MPX was detected in 1970 in the Democratic Republic of the Congo (DRC). In the current 2022 MPX outbreak, different nations are reporting MPX infected cases. The WHO Technical Lead Dr. Maria Van Kerkhove is rightly concerned and expects cases to increase further: "Monkeypox is a priority pathogen which needs investment for understanding transmission, severity, and Research" [2].

Past Outbreaks: Post-1970 DRC outbreak, MPX cases have been reported across 11 African countries (Central and West Africa). DRC and Nigeria are most affected and until today cases are being reported. MPX crosses the boundaries from Africa and for the first time, 70 cases of MPX infection linked to infected pet prairie dogs were reported in the USA in 2003. Subsequently, cases were reported from Israel (2018), UK (2018, 2019, and 2021), Singapore (2019), and USA (2021) [3].

Monkeypox is a *misnomer* as monkeys are not the major carriers but the virus persists for a long duration in squirrels, rats and rodents therefore could be correctly stated as '*Rodentpox*'. However, the name monkeypox is historically derived from the fact that the viral illness was documented for the first time in colonies of research monkeys in a Danish laboratory in 1958 [4].

Infection begins with flulike symptoms, fever, myalgia, fatigue, and rashes on the face and genitals making it noticed and easily detected. Lymphadenopathy differentiates MPX from smallpox infection. The major relief with the current MPX outbreak infection is the milder version of the virus having a fatality rate of less than 1% which usually resolves within four weeks (self-limiting). The central African (Congo basin) clade is responsible for the high severity of the disease with a case fatality rate as high as 10% [3].

Global outbreak of MPX: In May 2022, at least 12 non-African countries were identified with multiple MPX cases [5]. The first case was a British resident, who returned to the United Kingdom from Nigeria and tested positive for MPX on May 7, 2022. The other two cases detected were confirmed to have MPX of Western African clade, as identified using reverse transcriptase PCR on vesicle swabs. This clade has a case fatality rate of around 1%. In addition to these, other four identified cases were identified among males having sex with males (MSM). The US-CDC reported and confirmed a case of MPX virus infection on May 18, 2022, in a man from Massachusetts who had recently travelled to Canada [6].

As of May 20, 2022, in England (UK), 20 cases of monkeypox infection were detected and confirmed by UKHSA [7]. The virus has been extended beyond the UK and reported in Spain (40), Portugal (23), Canada (6), Belgium (4), Italy (3), Germany (3), Australia (2), United States (2), and one each from France, Israel, Sweden, Netherlands, and Switzerland counting to a total of 107 confirmed cases in addition to 83 suspected cases which is a matter of concern and investigation [8]. Reasons for popping up of cases suddenly could be due to mutations in the MPX virus, but the same can be ruled out as being a DNA virus having better at detecting and repairing mutations. This rapid spread is what has scientists on high alert.

The first draft genome sequence of the current MPX outbreak was obtained from a skin lesion of a Portugal male patient [9]. Phylogenetic analyses suggested the virus from this outbreak belongs to the mild West African clade and is closely related to the MPX virus isolated from the 2018–2019 UK, Singapore, and Israel outbreak.

Transmission dynamics: Zoonotic transmission to humans is possible through blood, bodily fluids, or lesions (cutaneous/mucosal) of infected animals like rope/tree squirrels, rats, dormice, and monkeys. Rodents are the most likely natural reservoir of MPX but are still inconclusive. Ideally, humans get an infection from animals in the endemic region and import the virus to other countries.

Human to human transmission via droplets or bodily fluid is uncommon but can spread through prolonged close bodily contact or sharing the contaminated objects, contact with body fluids or monkeypox sore contaminated clothing and bedding through respiratory droplets, respiratory secretions, and skin lesions of an infected person. Vertical transmission from mother to foetus also possible resulting in congenital monkeypox. The sexual transmission route for MPX is still debatable.

Sexual contacts: a possible new route of transmission: According to WHO, no single source of infection has yet been confirmed. Scientists raised speculations about the new route of community transmission which may require urgent investigation. Since MPX is not considered a sexually transmitted infection, surprisingly in this outbreak, many of the global reports of MPX cases are occurring within sexual networks. UKHSA found a majority of the MPX cases from London and England in gay, bisexual, or men who have sex with men and had no travel history to MPX endemic countries. An alternative explanation for this unexpected transmission pattern could be the coincidental introduction and continued circulation of the virus into this community. Possibly virus might have been spreading silently, which is a matter of deep concern. This raised the question among the public health experts about the origin, mode of transmission, and spread.

Containment, prevention, and vaccination strategies: Since the global eradication of smallpox in 1980, smallpox vaccines are not given widely to kids. Also, original first-generation smallpox vaccines are now

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no longer readily available to the general public. This left the globe vulnerable to outbreaks of MPX owing to weakened or no immunity.

Treatment is generally supportive in managing the complications, as there are no specific drugs available. However, antiviral tecovirimat which was originally developed for smallpox was licensed by European Medical Association (EMA) for MPX in 2022, but its use for patient care should be monitored.

The smallpox vaccine works quite well (85% effective) to protect people against MPX, however, a deadly infection may cause severely immunocompromised people. In 2019, the US-FDA approved JYNNEOS (Imvamune), a two-dose vaccine based on a modified attenuated vaccinia virus (Ankara strain) for the prevention of MPX under the Strategic National Stockpile (SNS), which also protects against smallpox [10]. 'Ring vaccination' strategy involving vaccination to the close contacts of infected persons to dismantle the transmission route, could be a choice to contain the spread of MPX. However, in the conditions so far, strict containment measures are not required.

In conclusion, although there is a surge in MPX cases in non-endemic countries around the globe, it still warrants epidemiological investigation. This time virus becomes more transmissible, as it appears that the virus changes its route of transmission and thus may be more of a global threat. The sexual route which is ideally not associated with MPX infection transmission needs to be revisited, considering the current outbreak where cases are dominated by sexually active men involving gays and MSM. Any symptoms resembling smallpox, chickenpox, or monkeypox should not be ignored and immediately be reported to the medical officials for tracing the origin and containment to limit the expansion of the disease. So far no death has been reported which is a big sigh of relief.

Ethical approval

As no animal or human subjects are involved in this study, therefore not require any ethical approval.

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Author contribution

Vikram Thakur: Conceptualization, Data curation, Visualization, Writing-Original Draft, Writing-review & editing. **Sonakshi Srivastava:** Writing-review & editing. **Pryanka Thakur:** Data curation, Writing-Original Draft, Writing-review & editing. **Pradeep Kumar:** Supervision, Writing-review & editing. All authors reviewed and approved the final version of the manuscript for publication.

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Data statement

The data and information in this correspondence article is freely available in public domain. Moreover, available data is not sensitive and not of a confidential nature.

Declaration of competing interest

None.

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